MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 3, 2015/2016

PEM0016 – ALGEBRA

(All sections/groups)

3 JUNE 2016
3.00 p.m to 5.00 p.m
(2 Hours)

INSTRUCTIONS TO STUDENT

1. This question paper consists of **3** pages including the cover page.
2. Attempt **ALL FOUR** questions. All questions carry equal marks and the distribution of marks for each question is given.
3. Please write all your answers in the answer booklet provided.

Answer ALL the questions (100 marks).

Question 1 (25 Marks)

(a) Solve the following equation by using quadratic equation in form.

$$x^4 + x^2 - 20 = 0$$ (5 marks)

(b) Determine the real solution of $\sqrt{|x-1|} = x - 7$. (8 marks)

(c) Given a rational function $R(x) = \dfrac{4x^2 - 8x + 3}{x + 2}$.

Solve $R(x) \leq 0$ and express your answer using interval notation. (7 marks)

(d) Find the term containing x^3 in the expansion of $(8x + 5)^5$. (5 marks)

Question 2 (25 Marks)

(a) Given a function $f(x) = 2 - \log_2(2x)$.

i) Graph $f(x)$ by using transformations. Show each transformation in different graphs and label two coordinates in each graph. (8 marks)

ii) Determine the inverse of $f(x)$. (5 marks)

iii) State the asymptote for $f(x)$ and $f^{-1}(x)$. (2 marks)

(b) Given $h(x) = \dfrac{2x-1}{2-x}$ and $k(x) = \sqrt{3x}$.

i) Determine $h \circ k(x)$ and its domain.
Express your answer using interval notation. (6 marks)

ii) Determine $k \cdot h(x)$ and its domain.
Express your answer using interval notation. (4 marks)

Continued...

Question 3 (25 Marks)

(a) Given a polynomial function $f(x)=2x^4-3x^3-17x^2+27x-9$.
It is known that $(x-1)$ is one of the factors.

i) Using Rational Zeros Theorem, list down all the potential rational zeros. (2 marks)

ii) Determine all real zeros of $f(x)$. (7 marks)

iii) Sketch the graph of $f(x)$ and label coordinates for all real zeros. (4 marks)

(b) Find the partial fraction decomposition of $\dfrac{3x^2+1}{(x-2)(2x^2+2x+1)}$. (12 marks)

Question 4 (25 Marks)

(a) Given matrix $A=\begin{bmatrix} p & 3 & -1 \\ 4 & 8 & k \end{bmatrix}$, matrix $B=\begin{bmatrix} 6 \\ k \\ 2 \end{bmatrix}$ and matrix $AB=\begin{bmatrix} 13 \\ 34 \end{bmatrix}$.

Determine the value of p and k. (4 marks)

(b) Given matrix $Q=2I_3$ and matrix $M=\begin{bmatrix} 1 & 0 & 1 \\ 2 & 1 & 4 \\ 3 & 1 & 6 \end{bmatrix}$.

Determine $2|M|Q$. (6 marks)

(c) Solve the following equations by using **inverse matrix method**. (15 marks)

$$\begin{cases} 2x+y-z=2 \\ 5x-2y+z=8 \\ x+y+2z=18 \end{cases}$$

End of Paper